

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
31 October 2002 (31.10.2002)

PCT

(10) International Publication Number
WO 02/086954 A1

(51) International Patent Classification⁷: **H01L 21/268**

(21) International Application Number: **PCT/US01/12799**

(22) International Filing Date: 19 April 2001 (19.04.2001)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicants (for all designated States except US): **THE TRUSTEE OF COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK [US/US]; 116th Street and Broadway, New York, NY 10112 (US). NVIK CORPORATION [US/US]; 6 Skyline Drive, Hawthorne, NY 10532 (US).**

(72) Inventors; and

(75) Inventors/Applicants (for US only): **SPOSILLI, Robert, S. [US/US]; Apartment 1C, 190 Claremont Avenue, New York, NY 10027 (US). IM, James, S. [US/US]; Apartment #74, 520 West 114th Street, New York, NY 10025 (US).**

(74) Agents: **TANG, Henry et al.; Baker Botts LLP, 30 Rockefeller Plaza, New York, NY 10112 (US).**

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

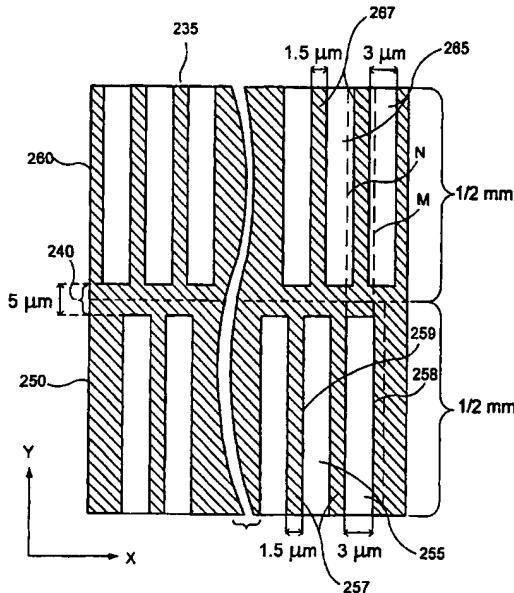
— with international search report

[Continued on next page]

(54) Title: **METHOD AND SYSTEM FOR PROVIDING A SINGLE-SCAN, CONTINUOUS MOTION SEQUENTIAL LATERAL SOLIDIFICATION**



WO 02/086954 A1



(57) **Abstract:** A method and system for processing a silicon thin film sample on a substrate. The substrate has a surface portion that does not seed crystal growth in the silicon thin film. The film sample has a first edge and a second edge. An irradiation beam generator is controlled to emit successive irradiation beam pulses at a predetermined repetition rate. Each of the irradiation beam pulses is masked to define a first plurality of beamlets and a second plurality of beamlets, the first and second plurality of beamlets of each of the irradiation pulses being provided for impinging the film sample and having an intensity which is sufficient to melt irradiated portions of the film sample throughout their entire thickness. The film sample is continuously scanned at a constant predetermined speed, so that a successive impingement of the first and second beamlets of the irradiation pulses occurs in a scanning direction of the film sample between the first edge and the second edge. During the continuous scanning of the film sample, a plurality of first areas of the film sample are successively irradiated using the first beamlets of the irradiation beam pulses so that the first areas are melted throughout their thickness and leaving irradiated regions between respective adjacent ones of the first areas. Also during the continuous scanning, each one of the first areas irradiated using the first beamlets of each of the irradiation pulses is allowed to resolidify and crystallize. During resolidification and crystallization of the first areas, a plurality of second areas of the film sample are successively irradiated using the second beamlets of the irradiation beam pulses so that the second areas are melted throughout their thickness. Each of the second areas partially overlaps a respective pair of the resolidified and crystallized first areas and the respective unirradiated therebetween.

rary of second areas of the film sample are successively irradiated using the second beamlets of the irradiation beam pulses so that the second areas are melted throughout their thickness. Each of the second areas partially overlaps a respective pair of the resolidified and crystallized first areas and the respective unirradiated therebetween.